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The Case for Asia – summary document

Rising productivity, higher valuations and
the strategic imperative for investors

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JPMorgan 
Asset Management

This research brief summarises our unique case for Asia ex-Japan as one of the most attractive strategic opportunities among global markets, based not on GDP alone, but on underlying productivity growth dynamics that we believe are fueling a long-term revaluation trend in the region.

We encourage those interested in our full report to contact your JPMorgan representative or visit our website at: www.jpmmam.eu/institutional



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Introduction

We believe that Asia (i.e., Asia ex-Japan) is on the brink of a long-term economic and stock market boom – driven by rising levels of productivity – which will provide investment opportunities within and beyond its public equity markets.

As a result, we believe Asia should be treated as a core strategic portfolio allocation and investors should consider allocations to this region as a strategic imperative.

The investment case we develop here is unique. It has many moving parts as we are looking at investments across different asset classes: public equity, private equity, and infrastructure. But they all add up to one key take-away for investors: productivity increases should spark a new cycle of investment, economic growth, and prosperity that will benefit all participants, public and private.

The growth is real – but its connection to returns is tenuous

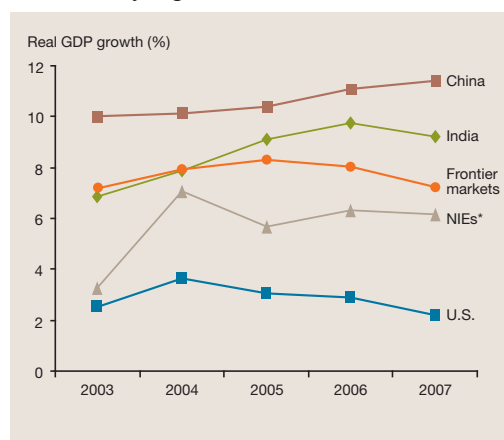
It is hard to ignore the economic growth phenomenon that has unfolded throughout Asia over the past two decades.

China became the world's fastest-growing economy from 1995 to 2007, growing at an average rate of 9.6% each year: hailed by *The Economist* (2005) as the "great leap forward" and "a model of reform." India's real GDP growth, although lower than China's, has been 6.9% on average since 1995, constantly above 9% for the last three years (in real terms).

This very strong growth is not limited to China and India. Indeed, in 2007, all countries in Asia results have grown at least twice as fast as the United States (in real terms):

- Over the last four years, GDP for each of the Eastern Region New Industrialised Economies (South Korea, Taiwan, Singapore, and Hong Kong) consistently grew at a rate above 3%.

Exhibit 1: Real GDP growth in Asia has been consistently higher than in the U.S.



Sources: JPMorgan Asset Management, IMF. As of 31/12/07.
*New Industrialised Economies.

- Over the last three years, GDP growth in Asia's Frontier Markets was consistently over 5% per year.¹

Now, conventional wisdom dictates that investors seeking high returns should invest in countries with high rates of economic growth because such countries should offer a wider set of opportunities to exploit abnormal returns. Economic growth should have a positive impact on companies' earnings, logically resulting in higher returns for shareholders.

Unfortunately, and contrary to popular wisdom, economic growth is not an accurate proxy for equity returns, and therefore not a sufficient investment thesis for driving allocations to Asia.

¹ Our definition of Asia's Frontier Markets includes Bangladesh, Kazakhstan, Pakistan, and Sri Lanka.

Over the short run, evidence suggests that changes in economic growth do impact stock prices. This impact, however, can be cyclical in nature and does not necessarily translate to permanent increases in valuations.

In fact, we only need to look at a single statistic to understand that economic growth is not a reliable indicator of long-term potential equity returns: **The correlation between real per-capita GDP and compounded real equity returns, for 16 countries over the period 1900 to 2002 (representing over 90% of world market capitalisation), is -0.37.²**

Productivity as a catalyst for investment and higher equity returns

We believe – and the evidence suggests – that a more reliable indicator of potential equity returns is the prospect of productivity-driven growth in price-to-earnings (P/E) ratios.

We develop a flow chart (Exhibit 2) to illustrate a sequence of events in which productivity is a key driver of a broad economic regime featuring growth, investment, and higher equity returns.

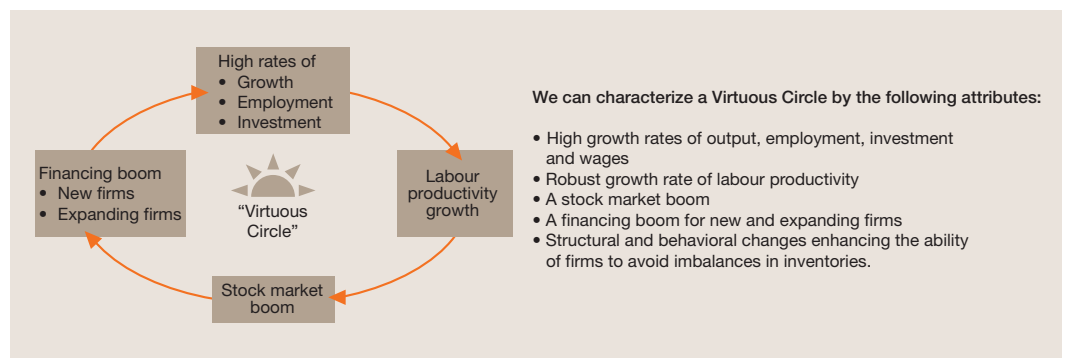
In sum, this framework suggests a “virtuous circle” (which can be applied to a number of economies) where higher productivity leads to higher valuations, which in turn lead to higher productivity.

The cycle can be summarised as follows:

- The prospect of higher productivity drives up the market value of firms due to higher expected future profits, thus resulting in an increase in P/E ratios.
- At the firm level, financing constraints become relaxed and firms find new potential to operate at a higher level of labour and capital.
- At the industry level, this pushes up labour demand as well as wages.
- Entrepreneurs react by increasing productivity of existing labour at the margin.
- Successful firms expand, those that fail (or whose traditional practices do not yield enhanced productivity) eventually contract and exit the industry.
- This results in what we refer to as a “reallocation” effect where more efficient firms engage in practices yielding even higher levels of labour productivity.

In particular, this framework of productivity-driven P/E growth can be applied to the U.S. experience, where there is sufficient data to enable robust analysis. Exhibit 3 plots average labour productivity growth and the price-earnings ratio in the post-World War II United States.

Exhibit 2: A “Virtuous Circle” with productivity growth as a key driver



Source: JPMorgan Asset Management.

² See Jay Ritter (2005), “Economic Growth and Equity Returns,” *Pacific-Basin Finance Journal*, Vol 13, pp. 489-503.

Exhibit 3: U.S. productivity as a long-run driver of price-to-earnings ratios



Sources: MSCI, The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007.

The figure shows clearly how the period can be divided into three regimes:

1. Rapid acceleration in productivity during the 1960s (the “Golden Age”)
2. A slowdown following the exogenous supply-side energy shocks of the early 1970s, and
3. A resurgence from the early to mid-1990s onward, which we refer to as the revival period, or the “New Economy.”

These key growth periods in modern U.S. history featured rapid economic expansion accompanied by a stock market boom, as well as a financing boom for new and expanding firms.

The last U.S. regime (i.e., the “New Economy”) saw a number of events benefiting owners of capital – events that we believe were driven by the prospect of future productivity growth.

Our analysis also extends to other developed economies, such as Japan, where we are able to identify two distinct economic regimes:

- The period from 1960 to 1973, characterised by high productivity growth of 8.1% per year on average, and compound public equity market returns averaging 12.3% per year.
- The period from the first major oil shock in 1973 onwards, marked by a decline in productivity growth to an average of 2.5% per year and compound public equity market returns of only 5.2% per year.³

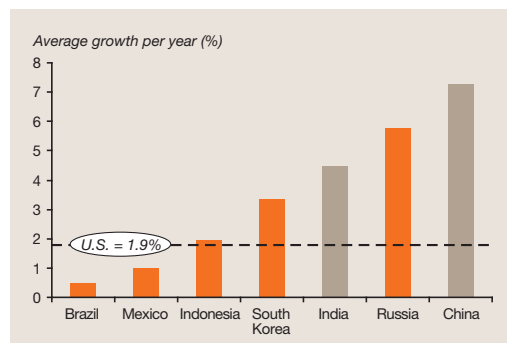
Of course, a rise in productivity was one of a number of factors that contributed to the success of these economies.⁴ However, recognising the existence of these economic regimes offers a platform from which we can provide a theoretical construct with validity beyond the United States, namely in Asia.

We believe that impressive recent productivity gains are compelling evidence that this productivity dynamic is exactly what is taking place in Asia today. Moreover, we believe that the region can expect continued productivity gains for the medium term, setting the stage for rising equity valuations in Asia.

³ Based on Tokyo Stock Price Index returns from 1960 to 2007 sourced from Datastream.

⁴ We allow for some of these factors, such as interest rates, inflation, and oil prices, in our analysis later in this paper.

Exhibit 4: Impressive Chinese and Indian productivity growth from 1996 to 2006 reflects structural improvements in capital deepening and input use efficiency



Sources: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007.

Productivity: Setting the stage for upward revaluation in Asia

Let us start with a review of recent productivity growth for seven emerging markets compared with the United States (Exhibit 4). Here, two of the most impressive results – for India and China – largely reflect structural improvements in capital deepening and input use efficiency. We believe that such trend productivity gains will continue across the Asian region, driven by a wide range of factors, such as:

1. Macro-political and economic trends – including trade liberalisation, privatisation of state-owned enterprises, and the movement of labour from predominantly agricultural production to industrial manufacturing.
2. Investment in infrastructure and other productivity-supporting initiatives – which also spills over into increased domestic production of primary materials (e.g., steel and cement); competing with foreign producers has, in turn, driven greater efficiency and lower prices for domestic production, which has contributed to productivity increases.
3. A spill-over effect from the larger regional economies to smaller ones – downward pressure on the costs of production not just for a range of goods, but for the factors of production themselves, especially in the large economies of India and China, should spill over into the entire region through high levels of intra-regional trade—a further enhancement to productivity.

4. Targeted investment in “intangibles” + through higher R&D and technology spending – which has been a pivotal driver of the pace of productivity growth; this last element is key as growth in “intangibles” has been cited by a number of prominent economists as a key driver of productivity.⁵

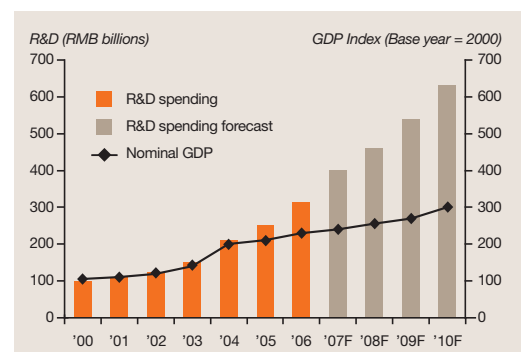
Intangibles have a positive impact on company margins. For example, it has been demonstrated that technology innovations reduce the price of inputs relative to economy-wide aggregate output prices. This directly impacts a firm’s margins, which increases productivity of capital.

The primary driver of intangibles is research and development (R&D), and here we see a strong historic trend of rising investment, as well as projected escalating growth rates for medium-term R&D spending.

In China, for example, the government has committed itself to R&D spending growth of 21% per annum over the next three years – increasing R&D spending from 1.5% of GDP in 2007 to 2.1% by 2010 (Exhibit 5). In fact, China’s growth in R&D expenditures is expected to outstrip nominal GDP growth over the next 15 years.

And on balance – based on the drivers described above, among others – we see historical growth in productivity not only continuing, but spreading throughout the region as smaller economies begin catching up to the larger ones.

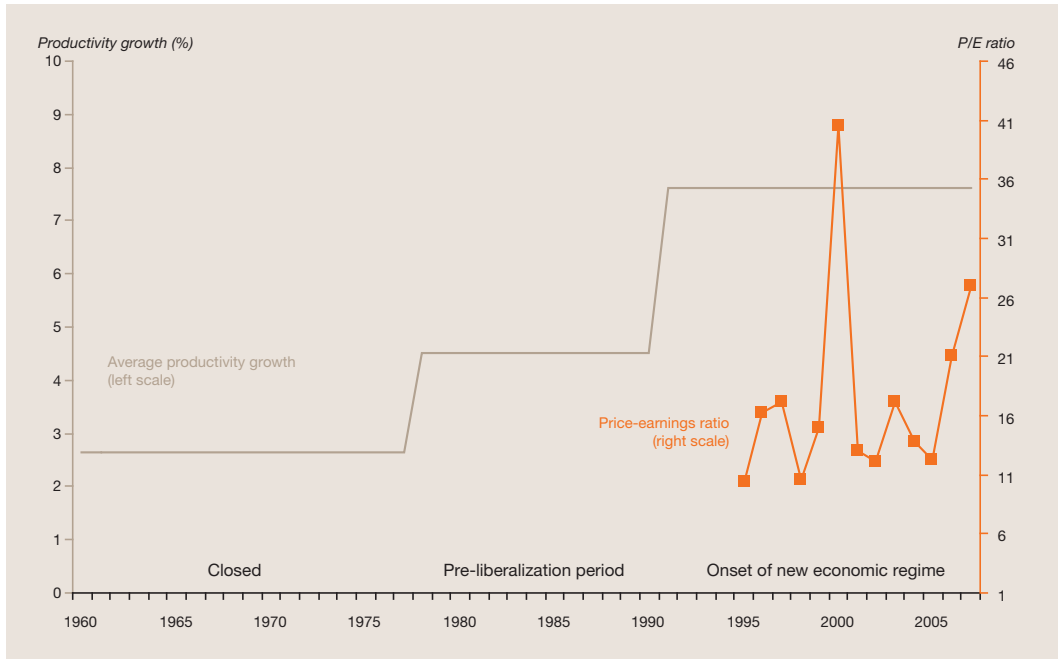
Exhibit 5: China’s R&D spending growth is expected to outstrip the growth rate of nominal GDP over the next few years



Sources: JPMorgan Asset Management, Deutsche Bank, “China’s Innovation Drive,” Special report, Global Markets Research, June, 2006.

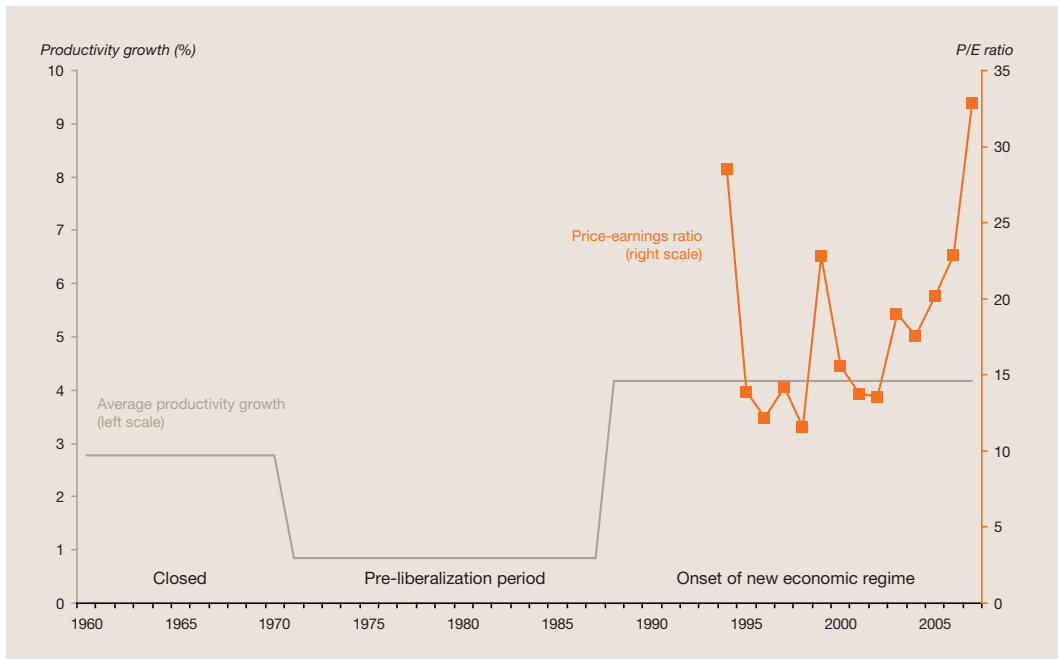
⁵ See Boyan Jovanovic and Peter L. Rousseau (2003), “Two Technological Revolution,” *Journal of the European Economic Association*, Vol. 1, pp. 419–428.

Exhibit 6: Productivity leading P/E in China*



Sources: JPMorgan Asset Management, MSCI, The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007.

Exhibit 7: Productivity leading P/E in India*



Sources: JPMorgan Asset Management, MSCI, The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007.

*Data limitations prevent us from overlaying P/E ratios for the entire time horizon. However, we believe that the segment of data we have is sufficient for the purpose of empirical analysis.

Exhibit 8: China and India at the onset of a new economic regime

	China			India		
	1991	2005	Annual growth over period	1988	2005	Annual growth over period
Productivity is stronger Real GDP per worker	\$3,476	\$9,961	+7.3%	\$3,299	\$6,198	+3.6%
Stock markets are deeper Stock market capitalisation as % of GDP	0.5%	34.8%	+32.0%	8.1%	68.6%	+12.6%
Investments are increasing Foreign Direct Investment inflow as % of GDP	1.2%	3.5%	+7.7%	0%	0.8%	+19.9%
Economy is growing Real GDP (in millions)	\$2,264	\$7,522	+8.3%	\$979	\$2,614	+5.6%

Sources: JPMorgan Asset Management, WDI, The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007.

The net result is that we view Asia's productivity trend as sufficient to set the stage for a new regime of economic expansion, as well as the stock market and investment booms that are likely to go with it.

Using available data, we are indeed able to identify three distinct periods of productivity growth for both China and India.

We define the three periods as:

1. Closed economies
2. Pre-liberalisation, and
3. The onset of a new economic regime similar to the "Golden Age" and "New Economy" seen in the United States.

Exhibits 6 and 7 illustrate these regimes.

We believe that we are seeing the onset of a new economic regime for the region as the indicators in Exhibit 8 suggest for China and India.

In our view, this new regime will feature a long-term stock market boom and revaluation, as well as a financing boom – an overall dynamic that will allow the Asian region to shift to a new strategic regime of economic expansion, featuring higher economic output, employment, investment, and wages.

Productivity drives P/E: Making the link using econometric modeling

Establishing the case for productivity-driven P/E growth—and a strategic investment case

for Asia—requires us to test our theory that productivity is, in fact, a driver of P/E gains.

We do this by first using a formal statistical technique (called "cointegration[†]") which establishes a long-run equilibrium relationship between productivity and P/E ratios. We then construct a simple econometric model that relates changes in productivity to past changes in both productivity and P/E, and measures deviations in productivity and P/E from their long-run relationship.

Once we establish the nature of the productivity-P/E relationship, we can use this model to test whether productivity is causing gains in P/E (Exhibit 9), and whether any such gains would be permanent or transitory. (A comprehensive description of these analytical processes is contained in the complete paper.)

- Based on this model we find strong evidence that productivity does, in fact, lead P/E growth for most markets[‡] in the Asian region.[§]
- In addition, when we test for the permanence of our "productivity effect," we find a long-term positive impact (see Exhibit 10). This test is conducted by applying a one-standard deviation shock to productivity within the model – at time zero – and gauging its impact on the path of P/E ratios. We use this approach because while follow-on effects of higher productivity are observed over time, productivity itself tends to arrive in relatively short spurts or "shocks."

[‡] See Jay Ritter (2005), "Economic Growth and Equity Returns," *Pacific-Basin Finance Journal*, Vol 13, pp. 489-503.

Exhibit 9: Results show productivity leading P/E in a long-run relationship in China and India

Country	Long-Run Relationship	Direction of Causality	
		Short-Run	Long-Run
China	Yes (High)	Inconclusive	Productivity Leading P/E
India	Yes (High)	Two-Way Feedback	Productivity Leading P/E

Source: JPMorgan Asset Management analysis.

Notes: "High" refers to the level of statistical significance being above the 1% level. "Inconclusive" refers to the fact that we could not, based on the specification of the model, statistically discern a significant linkage. See Appendix A for model details.

We also find that productivity shocks lead to permanently elevated levels of P/E ratios in three of the other five Asian countries – Singapore, Indonesia and Pakistan (not shown).

We are not able to verify this for South Korea and Malaysia, where the response of P/E ratios to productivity shocks appears transitory.

Finally, to further enhance the power of the model, we pool data across 12 emerging and frontier market countries, with various sample ranges across time. We then develop a simple panel model explaining P/E ratios as a function of productivity, oil prices, foreign direct investment, savings, inflation, and global interest rates (Exhibit 11).

Our analysis finds productivity to be very significant in explaining P/E ratios. In addition, the direction of influence is positive – in line

with our expectations. Combined with our prior results, which established historic and forward-looking dependence, we can now establish – with a high degree of statistical significance – that on average, an increase in productivity in Asia leads to a permanent increase in P/E.

Putting the thesis to work: Public equity, private equity, and infrastructure investing in Asia

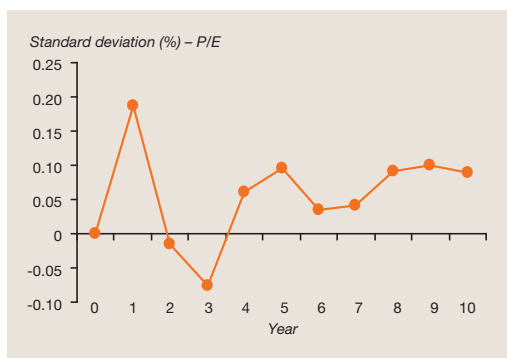
Based on our productivity thesis we carry out an extensive analysis of how investors might take advantage of opportunities in three key investment categories:

- Public equity
- Private equity
- Infrastructure

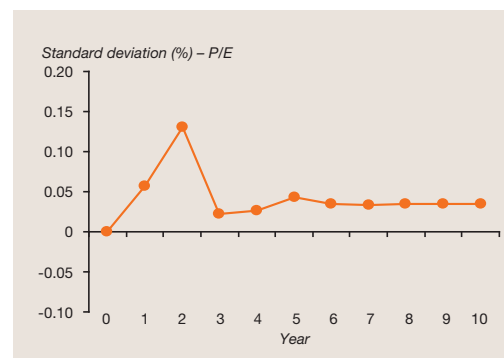
In the complete paper, we explore these asset classes in detail. Here, we present those findings in summary.

Exhibit 10: Shocks to productivity have a permanent impact on P/E in China and India

Panel A: China



Panel B: India



Sources: JPMorgan Asset Management analysis.

Exhibit 11: Productivity is a long-run driver of P/E ratios across countries and time

Factor	Expected sign of influence	Actual sign of influence	Impact
Productivity	Positive	Positive	Very significant
Oil Price	Negative	Negative	Significant
Foreign Direct Investment	Positive	Neutral	Not significant
Savings	Positive	Neutral	Not significant
Inflation	Negative	Neutral	Not significant
Interest Rates	Negative	Neutral	Not significant

Sources: JPMorgan Asset Management analysis. Historical data from MSCI, The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2007 and World Development Indicators (WDI).

Notes: Estimation of the panel was performed using Ordinary Least Squares on an annual dataset from 1990 to 2006 inclusive. Interval of available data varies by country.

The impact of overweighting Asian equities

With respect to public equities, we believe that Asia deserves to be considered relative to its natural global market cap allocation or perhaps even as an explicit portfolio overweight above its market cap allocation.

We analyse a potential strategic overweight using a stochastic “Monte Carlo” simulation model and arrive at some interesting results. The higher projected median value for portfolios with an Asia overweight indicates a higher expected return from the allocation – and all else being equal, this is consistent with our expectations of a return premium for Asian equities.

In addition, these portfolios also exhibit a **less severe worse-case scenario** given the Asia allocation, all else being equal. Due to the “de-coupling” from the West that many Asian economies are experiencing, low correlation acts to cushion large negative returns in developed markets, potentially smoothing volatility and increasing overall portfolio returns.

To be sure, investing in Asia presents risks – many of which are discussed in the Addendum on page 13 – but our analysis shows the net effect, over the long term, of an overweight to Asia is higher projected median values and higher downside portfolio values* – which represents an overall increase in portfolio efficiency.

Opportunities in Asian private equity

Asia is a magnet for private equity and venture capital investing, with a compound annual growth of 90% in fund raising over the last four years.⁶ Given this trend, it is appropriate to try to gauge the potential impact of productivity on this key market.

We analyse four key drivers of private equity market development – productive entrepreneurship, productivity growth, financial market deepening, and capital inflow – and use a dynamic panel model to test the direction and significance of their influence on our seven Asian private equity markets (China, India, Singapore, South Korea, Thailand, Indonesia, and Malaysia).

The most important result, from the perspective of our investment thesis, is that productivity growth is very significant in explaining private equity market development.

In Asia, however, the private equity opportunity set is a bit different, with the main opportunities reflecting both the region’s rapid economic expansion and focus on productivity growth:⁷

1. Start-up and high-tech funds – these are most similar to traditional venture capital type providers
2. Corporate restructuring funds – characterised by investments in more established, expansion oriented enterprises

⁶ Asia ex-Japan. Source: EMPEA estimates, 02/29/08.

⁷ The argument is made extensively by Sayed Ahmed Naqi (2007), “Venture Capital or Private Equity? The Asian Experience,” Harvard Business Publishing.

3. Infrastructure funds – facilitated through legislative changes, direct funding, and other forms of public-private partnerships
4. Privatisation funds – focused primarily on improving efficiency of state enterprises.

Capturing returns in this space will entail selecting the right manager – and not simply based on their ability to gather assets (often seen in Asia as a testament to a manager’s potential investment skill). Other aspects of the manager’s skill set are more critical, such as:

- Access to local liquidity (in entering and exiting investments)
- Nimbleness to deploy capital quickly to short-lived opportunities, and
- Ability to deal effectively with government red tape.

In particular, given the relatively small size of private equity deals in Asia (compared to the West), there is also the of risk of too much capital chasing too few opportunities.

Avoiding these specific pitfalls, in addition to generic manager selection risks, will be critical to realising the high return potential the growth of Asia’s private equity market presents.

The link to infrastructure

Many Asian countries are actively managing their infrastructure investment programs with the explicit intent of enhancing productivity and growth. In this new “institutional environment,” key policy mechanisms are driving wealth creation for private investors and higher productivity for these economies. For example:

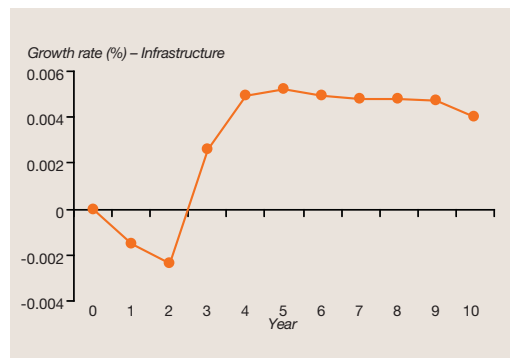
- Public licensing and regulatory policies offer incentives to private firms to become “common carriers.”
- Government co-investment offers private investors the benefits of reduced cost and greater participation in large-scale projects.
- Targeted capital allocations with explicit investment risk guidelines offer greater overall efficiency.

A feedback mechanism also enhances infrastructure development through higher rates of productivity, which then drive economic growth and more demand for infrastructure. Based on an econometric model (similar to the one used to analyse the productivity-P/E relationship), we identify such a feedback relationship among infrastructure investment, productivity and growth in both China and India.

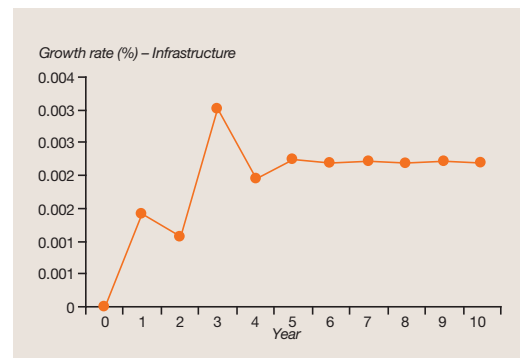
Moreover, when we apply a one-time productivity shock to the system, we see permanent increases in infrastructure investment in both regions.

Exhibit 12: Productivity is pivotal in driving infrastructure development in Asia

Panel A: China



Panel B: India



Source: JPMorgan Asset Management analysis. Notes: Results were derived using a two vector error correction model (for China) and an unrestricted vector autoregression model (for India) using up to two lags and an annual data set from 1980 to 2005 inclusive. See Appendix C of the complete paper for model details.

Overall, these results suggest that not only does infrastructure investment improve productivity and GDP growth, the feedback mechanism cycles back into higher demand for infrastructure investment. And finally, infrastructure investment should generate favourable spillovers to other sectors – e.g., resources (which provide inputs to infrastructure), services (which support these industries), and greater trade through the growth of transport links.

While our analysis focuses on China and India, we believe the conclusions apply across Asia, where rapid infrastructure development should favourably impact a range of other asset classes, including public equity, private equity and commodities.

A compelling strategic case for Asia

Investors in search of a viable investment thesis for Asia need look no further than the region's steady, impressive gains in productivity.

As in the two economic regimes in the United States (the 1960s "Golden Age" and 1990s "New Economy"), we believe that productivity gains in Asia will drive a virtuous circle of P/E gains and booms in financing and investment, leading to gains in output and further gains in productivity.

Our evidence, gleaned from across Asia indicates that there is a positive long-run causal link from changes in productivity to higher P/E ratios and that these effects tend to be permanent.

Given evidence of continuing strong productivity gains in Asia for the medium and long term, we see valuation growth in these markets for the foreseeable future: certainly with higher potential for risk-adjusted returns than available in developed markets.

For investors, this analytical approach provides a clear, viable and rigorous thesis on which to build a strategic approach to investing in Asia. This is far more compelling than the broadly accepted yet unproven "growth argument" driving more tactical allocations to Asia today. With respect to some of the region's key opportunities:

- We believe Asian equity should be seen as a "core" equity portfolio allocation, and not merely a "diversifier," a "tilt," an "emerging markets" play, or an "economic growth" play – and that investors should consider an over-weight relative to Asia's world market cap weight.
- The opportunities in private equity should continue to reflect Asia's strong growth (in productivity as well as overall economic expansion)—with manager selection being key to accessing the unique opportunities presented by this market.
- Infrastructure investment in Asia both fuels and benefits from overall productivity and economic growth—not only increasing the demand for infrastructure, but spilling over into other economic sectors to spark new investment opportunities there as well.

If one believes the case for higher valuations and increased opportunity based on productivity growth (which we argue is both quantitatively and qualitatively sound), then overweighting Asia is a strategic imperative – whether an investor would choose public equities, private equity, infrastructure, or any combination of the three.

The potential gain in portfolio efficiency from such an overweight, over long periods of time, is so pronounced that it appears to be a reliable means of lowering portfolio downside risk while increasing returns.

We welcome your thoughts and feedback.

For further details and a copy of our full research report, *The Case for Asia – Rising productivity, higher valuations and the strategic imperative for investors*, please contact your JPMorgan representative or visit our website at www.jpmmam.eu/institutional

Addendum: Risks

Any discussion of Asian investing would not be complete without accounting for some of the key macro-economic risks facing the region, particularly those facing the brightest star of Asian growth: China.

Below we outline our thoughts on the key risks at play in international markets and their potential impact on China's economic outlook:

Exchange Rate Appreciation: Currency appreciation is likely to follow a gradual path. Significant trade-weighted appreciation of the currency would have a favourable impact on China's terms of trade, giving China's economy room for domestic easing. Currency adjustment will slowly take on a more dominant role in monetary tightening if the scope of interest rate changes becomes limited.

Political Change: China has a unique political system, hence comparative analysis is limited. China continues its strategic focus on "building comprehensive national power" with a strong emphasis on economic development. China has become more active at deploying its economic and political capital to influence strategy both regionally and globally. Despite domestic political protests (relating to labour and property rights, reforms, and forced relocations), we believe that political power in China will stay firmly in place. But at the same time, politicians should be flexible and pragmatic enough to maintain policies that place a priority on macroeconomic stability.

Developed World-led Economic Slowdown: While a slowdown in the developed world will negatively impact China's growth rate, our analysis indicates that the effect is likely to be transitory. China's transition to a consumption-based, domestic demand-oriented economy is adding to the "decoupling" effect. In fact, though the issue of decoupling is still hotly debated, the entire region appears to be undergoing a significant shift away from dependence on the United States. Half of China's exports now go to other emerging economies. Emerging markets collectively send more than half their total exports to other emerging markets. As a group they now export

more to China than to the U.S. The four biggest emerging economies, which accounted for two-fifths of global GDP growth in 2007, are the least dependent on the United States. Assuming that emerging market fundamentals can remain relatively insulated from developed world credit troubles, trade between emerging nations will flourish and demand for commodities will remain high. Taken altogether, this should mean that in the event of a U.S. recession or sustained slowdown, China should be able to weather any repercussive impact.

Inflation: China has a low tolerance for inflation as it poses a risk to social and political stability. During the past 15 years, China's economy has become closely integrated into the global economy and China cannot avoid the consequences as inflation has also reappeared on the global scene. While the risk of pervasive inflation remains, the government seems to be pursuing a prudent set of measures. Maintaining price controls and delaying upward price adjustments for energy, however, is a double-edged sword. Faster appreciation of the RMB, as implemented since December 2007, will help on the margin to counter domestic inflation, but it will force accelerated adjustment in low-margin export industries.

Energy Consumption: As China's energy consumption significantly exceeds its energy production, China relies heavily on imported energy sources. While energy consumption is expected to grow, its rate of growth is expected to slow due to structural changes in the economy, i.e., a stable long-run economic growth rate path and a move towards stimulating the service industries. Despite the dependence on foreign sources, energy intensity (measured by the ratio of energy consumed to real GDP) has decreased since 1978. The recent five year plan has set targets to achieve energy conservation and ensure energy security. These measures serve to encourage the use of fuel-efficient vehicles, increase costs of heavy energy-intensive manufacturing and temper China's rapidly increasing demand for oil. Together, they help the economy move to a more sustainable energy policy.

Addendum: Risks (continued)

U.S. Protectionism: One of the biggest risks to global economic growth is protectionism. However, in the United States, it is still not certain exactly what form this could take. It is however clear that the main focus of any new trade barriers would be China. The most obvious risk is new anti-dumping and countervailing duties but there could be other complaints relating to Chinese practices. The ultimate enforcement mechanism is tariffs,

which could potentially be bad for growth assets (including U.S. equities) as well as for bonds. However, we feel the risk of this is low as the likelihood of an appreciating Chinese currency will keep protectionist sentiments at bay. CNY (yuan-dollar) movement is at the pinnacle of this issue since it is seen as a cornerstone in U.S. Treasury Secretary Henry Paulson's non-confrontational and holistic approach to U.S.-China economic relations.

+“Intangibles” are defined as technical and entrepreneurial knowledge that grows out of a commitment towards research and development. By definition, intangibles cannot be measured. Rather, they evolve out of the application of certain factors of production. For example, during the technology-led U.S. economic expansion in the early to late 1990s, investment in ITC equipment led to investment in unmeasured complementary intangibles such as organisational restructuring and innovations in production line efficiencies.

†“Cointegration” refers to an econometric technique designed for testing the existence of a long-run relationship between two or more non-stationary (random walk) variables. The economic and financial intuition comes by way of the fact that many of the relationships we observe in these fields are defined only over relatively long spans of time and include factors that behave as random walks. Cointegration tests were performed using the testing methodology due to Soren Johansen. See Soren Johansen (1991), “Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models”, *Econometrica*, Vol. 59, pp. 1551–1580, (and Appendix A of the complete report) for further details.

‡We find evidence of long-run causality (with changes in productivity leading to changes in P/E) in the cases of Singapore, Indonesia, and Malaysia. Surprisingly, in South Korea we find no evidence of a long-run relationship between the two factors, but short-run results seem to suggest a feedback relationship. In the case of Pakistan, despite no clear evidence to support the presence of a long-run relationship, we find compelling evidence to suggest that productivity changes lead P/E changes over the short run.

§Results were derived using a vector error correction model using two lags and an annual data set from 1990 to 2006 inclusive. “High” refers to the level of statistical significance being above the 1% level. For South Korea and Pakistan, the direction of causality was statistically meaningful only over the short term. Cointegration tests were performed using the testing methodology due to Soren Johansen (1991), “Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models,” *Econometrica*, 59, 1551-1580 (see Appendix A of the complete report for further elaboration). Sources: JPMorgan Asset Management, Datastream, WDI and IMF.

*Based on capital market assumptions detailed in Appendix D in the complete paper and in our publication JPMorgan Asset Management long-term capital market return assumptions, as of November 2007.



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